The Balloon Experimental Twin Telescope for Infrared Interferometry : Returning to Flight (BETTII)

Completed Technology Project (2017 - 2018)

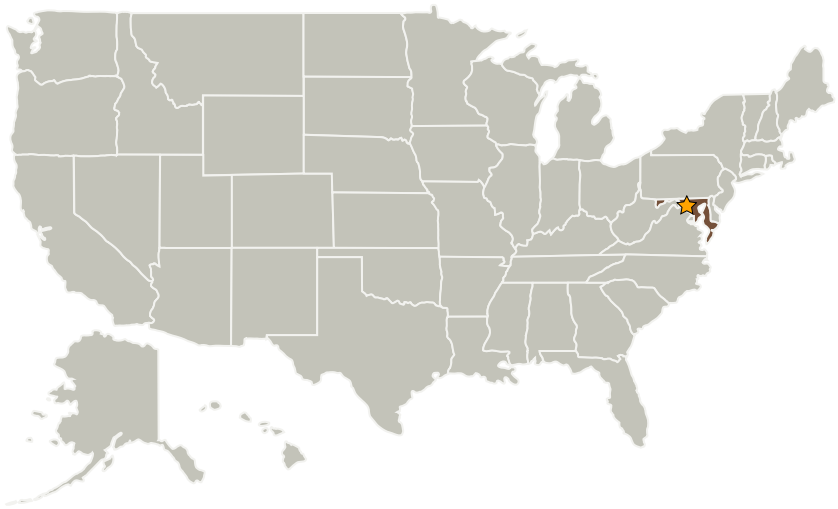
Project Introduction

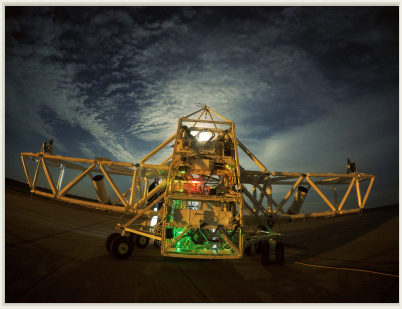
The Balloon Experimental Twin Telescope for Infrared Interferometry (BETTII) is an 8-meter far-infrared (30-90 micron) Michelson interferometer, designed to fly on a high altitude balloon. Scientifically, the spatially-resolved spectroscopy for BETTII will provide unique new scientific data for the study of star formation regions; technically, it paves the way for future interferometric space missions needed to answer key questions about our universe. The BETTII project was funded by NASA HQ from 2011-2017, and had an engineering flight in June 2017. At the end of the flight, an anomaly led to the loss of the payload. We are now working to rebuild BETTII, focusing this effort on lessons-learned from the flight an upon incorporating new designs to make BETTII2 even more capable.

Anticipated Benefits

The key aspect for the internally-funded effort is a redesign of the optical system. Through the addition of a dispersive backend to the interferometric instrument, sensitivity can be significantly improved, which will enable more science with the payload, while demonstrating another key technology for future missions.

Primary U.S. Work Locations and Key Partners





BETTII in Fort Sumner during night testing

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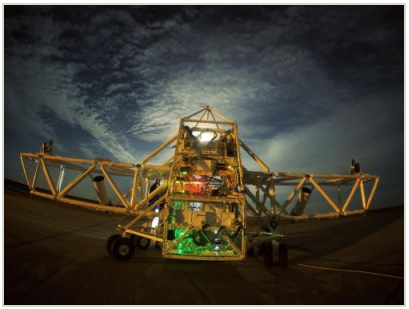
Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Southwest Research Institute - San Antonio(SWRI)	Supporting Organization	Academia	San Antonio, Texas
University of Maryland-College Park(UMCP)	Supporting Organization	Academia Asian American Native American Pacific Islander (AANAPISI)	College Park, Maryland

Primary U.S. Work Locations
Maryland

Images



BETTII at night
BETTII in Fort Sumner during night testing
(https://techport.nasa.gov/image/28295)

Organizational Responsibility

Responsible Mission Directorate:
Mission Support Directorate (MSD)

Lead Center / Facility:
Goddard Space Flight Center (GSFC)

Responsible Program:
Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:
Peter M Hughes

Project Managers:
Megan E Eckart
Timothy D Beach

Principal Investigator:
Stephen A Rinehart

Co-Investigators:
John E Mentzell
Arnab Dhabal

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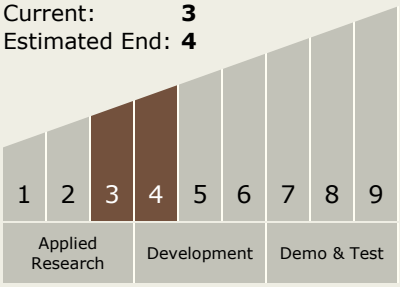
Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **4**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

Target Destination

Foundational Knowledge

Supported Mission Type

Planned Mission (Pull)